



Seasonic Prime PX-1600 (ATX v3.0)

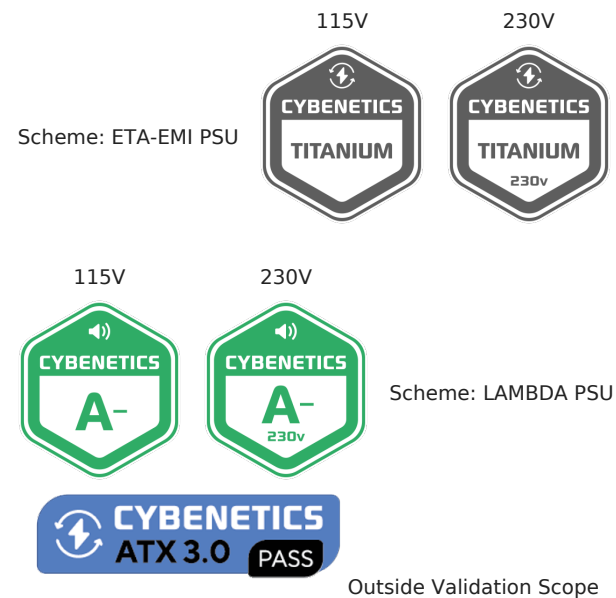
Serial Number

Lab ID SS16002169

Certification ID 252169

Test Result Report ID: 23PS2169A

Certificate Issue Date: Apr 11, 2023



General Information

Test Equipment

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 Chroma 63640-80-80 x10 Chroma 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P, GW Instek ASR-3500
Power Analyzers	Rohde & Schwarz HMC8015 & NPA701
Oscilloscopes	Picoscope 4444, Siglent SDS2104X PLUS
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Temperature Logger	Picoscope TC-08
Tachometer	UNI-T UT372
Multimeters	Keysight 34465A
EMI Analyzer	TekBox TBMR-110M-EU
Isolation Transformer	4kVA
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Testing Methodology	Cybenetics PSU Test Protocol

DUT Information(Non-accredited measurements)

Product Identification Details	
Brand	Seasonic
Model	Prime PX-1600 (ATX v3.0)
OEM/ODM	Seasonic
Serial Number	
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	15-10

Rated Frequency (Hz)	50-60
Rated Power (W)	1600
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	135mm Fluid Dynamic Bearing Fan (HA13525H12SF-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	SS16002169
Date of receipt	Mar 28, 2023
Testing Date	Apr 11, 2023
Report Issued Date	Apr 11, 2023
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

Modular Cables				
Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (610mm)	1	1	16-18AWG	No
4+4 pin EPS12V (700mm)	3	3	16AWG	No
6+2 pin PCIe (750mm)	6	6	16AWG	No
12+4 pin PCIe (750mm) (600W)	2	2	16-28AWG	No
SATA (510mm+155mm+155mm+155mm)	4	16	18AWG	No
4 pin Molex to SATA 3.3 Adapter (410mm+155mm)	1	2	18AWG	No
4-pin Molex (460mm+130mm+130mm)	1	3	18AWG	No

AC Power Cord (1340mm) - C13 coupler	1	1	16AWG	-
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Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	133.3	3	0.5
	Watts	125		1600	15	6
Total Max. Power (W)		1600				

Parts Description

General Data	
Manufacturer (OEM)	Seasonic
PCB Type	Double Sided
Primary Side	
Transient Filter	7x Y caps, 3x X caps, 2x CM chokes, 1x MOV
Inrush Protection	2x NTC Thermistor MF72-20D20M (20 Ohm) & Relay
Bridge Rectifier(s)	3x LVB2560 25A 600V
APFC MOSFETs	4x Infineon IPA60R0125P6 (600V, 25A @ 100°C, Rds(on): 0.125Ohm)
APFC Boost Diode	2x ST STTH8S06 (600V, 8A @ 175°C)
Bulk Cap(s)	3x Nippon Chemi-Con (420V, 820uF each or 2460uF combined, 2,000h @ 105°C, KHE)
Main Switchers	4x Infineon IPA60R080P7 (600V, 23A @ 100°C, Rds(on): 0.08Ohm)
Drivers IC	2x Silicon Labs Si8233BD
APFC Controller	Texas Instruments UCD28070
Resonant Controller	Champion CM6901T2X
Topology	Primary side: Interleaved PFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	16x Nexperia PSMN2R6-40YS (40V, 100A @ 100°C, Rds(on): 3.7mOhm)
5V & 3.3V	DC-DC Converters

Filtering Capacitors	Electrolytic: 5x Nippon Chemi-Con (105°C, W) 1x Nippon Chemi-Con (5-6,000h @ 105°C, KZH) 2x Nippon Chemi-Con (2-5,000h @ 105°C, KZE) 3x Rubycon (6-10,000h @ 105°C, ZLH) 2x Rubycon (3-6,000h @ 105°C, YXG) Polymer: 12x Nippon Chemi-Con, 22x FPCAP, 4x
Supervisor IC	Weltrend WT7527RA (OCP, OVP, UVP, SCP, PG)
Fan Controller	Nuvoton M031
Fan Model	Hong Hua HA13525H12SF-Z (135mm, 12V, 0.5A, Fluid Dynamic Bearing Fan)
5VSB Circuit	
Rectifier	1x Infineon BSC100N06LS3 FET (60V, 36A @ 100°C, Rds(on): 10mOhm)
Standby PWM Controller	Power Integrations INN3164C

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 Compliance	✓

Performance Summary

115V	
Accredited	
Average Efficiency (>1450 load combinations)	91.491%
Average Noise Output (>1450 Load Combinations)	29.52dBA
Average PF (>1450 Load Combinations)	0.988
Efficiency With 10W (≤500W) or 2% (>500W) Load	76.512%
Standby Power Consumption	0.0218W

Non-Accredited	
12V Ripple (Full Load)	19.49mV
5V Ripple (Full Load)	15.81mV
3.3V Ripple (Full Load)	13.39mV
5VSB Ripple (Full Load)	27.30mV
12V Load Regulation	0.45%
5V Load Regulation	0.64%
3.3V Load Regulation	0.79%
5VSB Load Regulation	1.06%
Inrush Current	17.040A

230V

Accredited	
Average Efficiency (>1450 load combinations)	93.656%
Average Noise Output (>1450 Load Combinations)	29.59dBA
Average PF (>1450 Load Combinations)	0.947
Efficiency With 10W ($\leq$ 500W) or 2% (>500W) Load	75.776%
Standby Power Consumption	0.1489W
Non-Accredited	
12V Ripple (Full Load)	21.45mV
5V Ripple (Full Load)	15.83mV
3.3V Ripple (Full Load)	13.66mV
5VSB Ripple (Full Load)	24.75mV
12V Load Regulation	0.44%
5V Load Regulation	0.60%
3.3V Load Regulation	0.79%
5VSB Load Regulation	1.12%
Inrush Current	34.720A
12V Transient Response (200%)	11.39V
5V Transient Response (200%)	4.931V
3.3V Transient Response (200%)	3.172V
5VSB Transient Response (200%)	4.818V

Hold-Up Time & PWR_OK Signal	22.10ms	
AC Loss to PWR_OK Hold Up Time	19.10ms	
PWR_OK Inactive to DC Loss Delay	3.00ms	
PSU Timings: T1 (20% / 100%)	72.0ms	41.0ms
PSU Timings: T3 (20% / 100%)	128.0ms	129.0ms
OPP (28.85°C / 39.80°C)	137.51%	135.57%

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	22.1
AC Loss to PWR_OK Hold Up Time (ms)	19.1
PWR_OK Inactive to DC Loss Delay (ms)	3



Tables

115V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.87 V	114.79 V	113.85 V	114.94 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.419	1.418	1.340	1.422	1.490	PASS
Mains Voltage THD:	0.21 %	0.17 %	N/A	0.32 %	2.00 %	PASS
Real Power:	0.022 W	0.004 W	N/A	0.041 W	N/A	N/A
Apparent Power:	11.478 W	11.448 W	N/A	11.511 W	N/A	N/A
Power Factor:	0.002	N/A	N/A	N/A	N/A	N/A

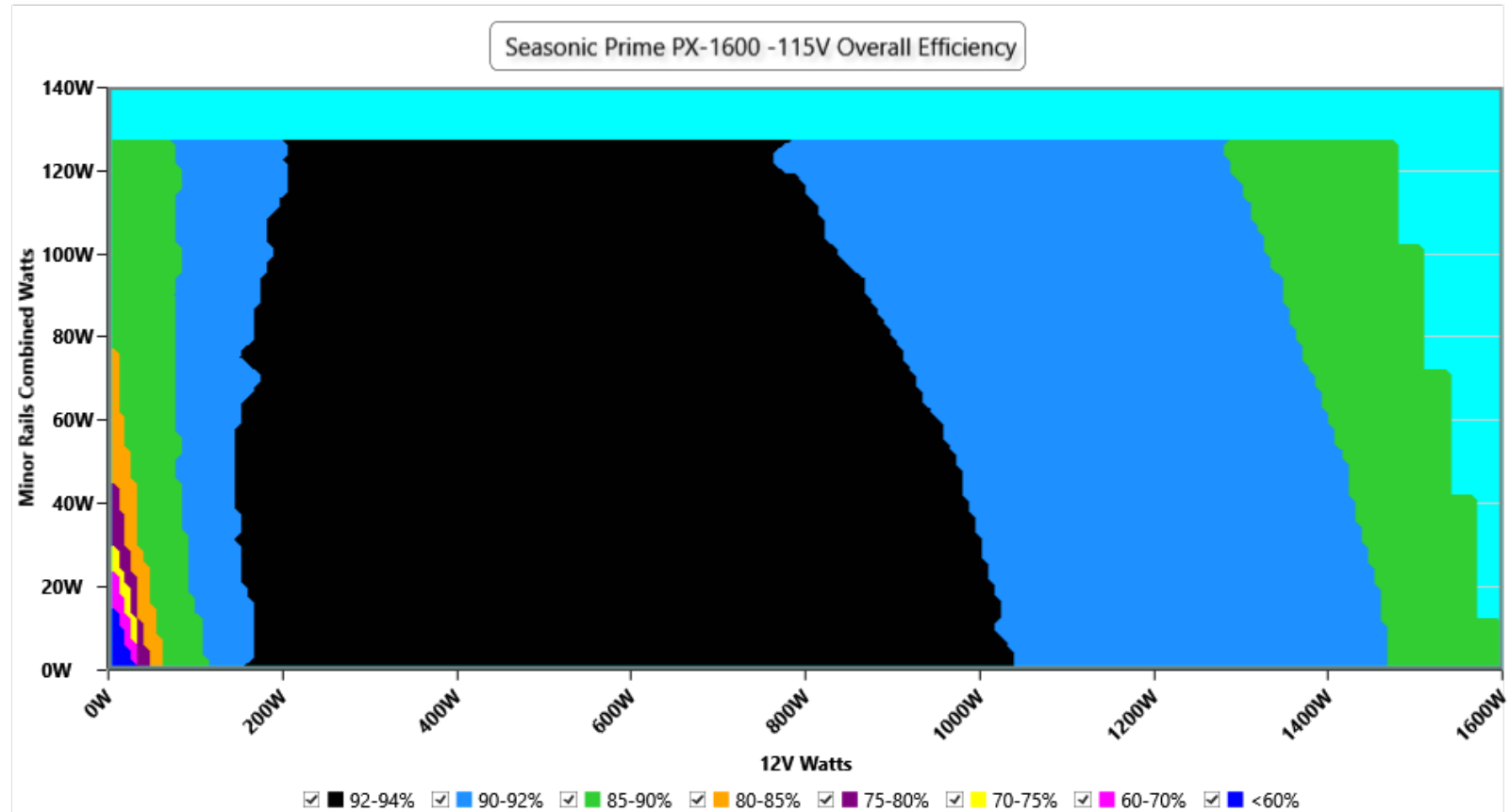
230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.76 V	229.69 V	227.70 V	229.86 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	49.98 Hz	49.50 Hz	50.02 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.417	1.416	1.340	1.418	1.490	PASS
Mains Voltage THD:	0.18 %	0.14 %	N/A	0.23 %	2.00 %	PASS
Real Power:	0.149 W	0.103 W	N/A	0.200 W	N/A	N/A
Apparent Power:	39.698 W	39.648 W	N/A	39.756 W	N/A	N/A
Power Factor:	0.004	N/A	N/A	N/A	N/A	N/A

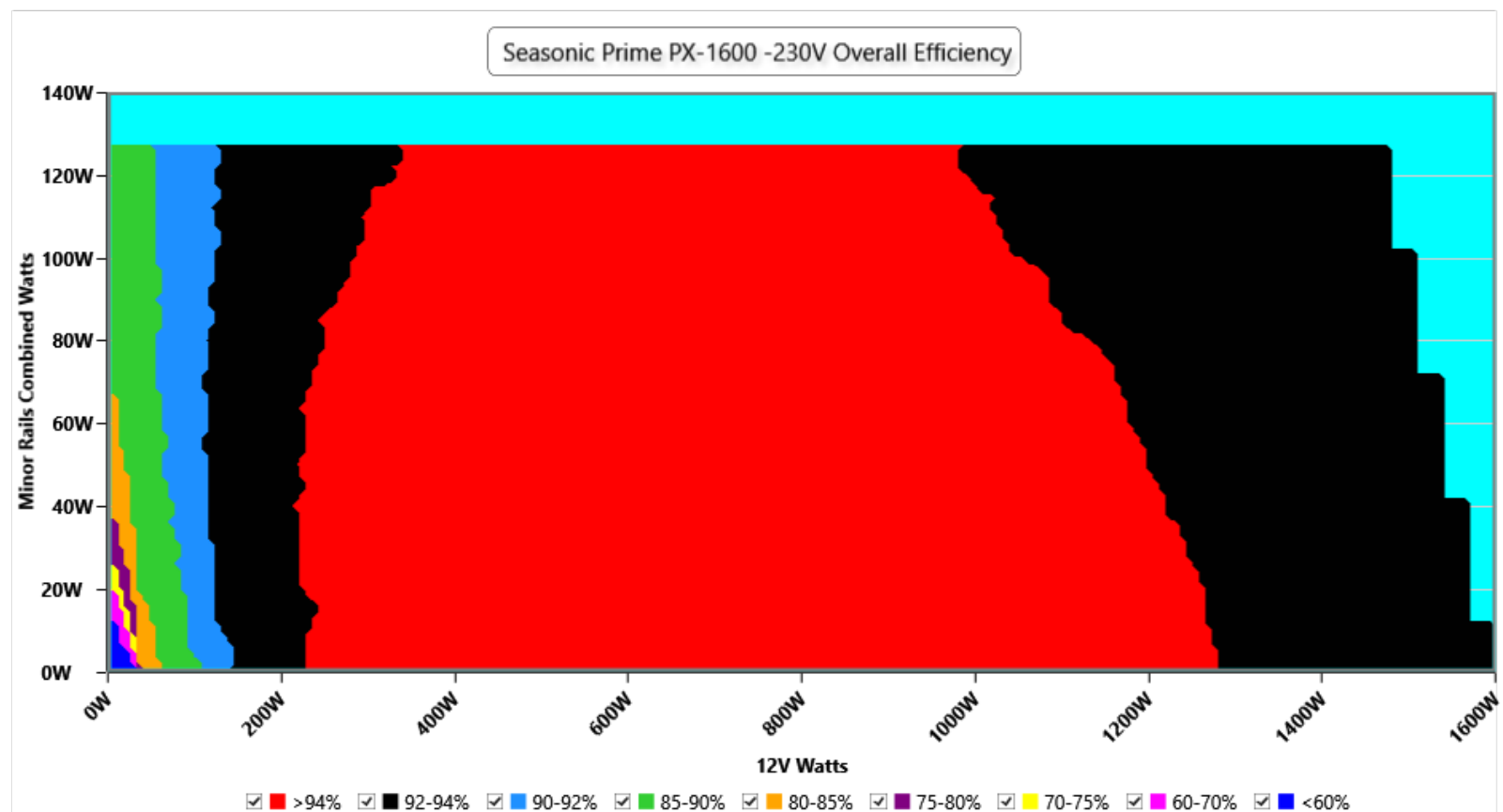
Efficiency Graph

115V



INFO

This graph depicts the PSU's efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

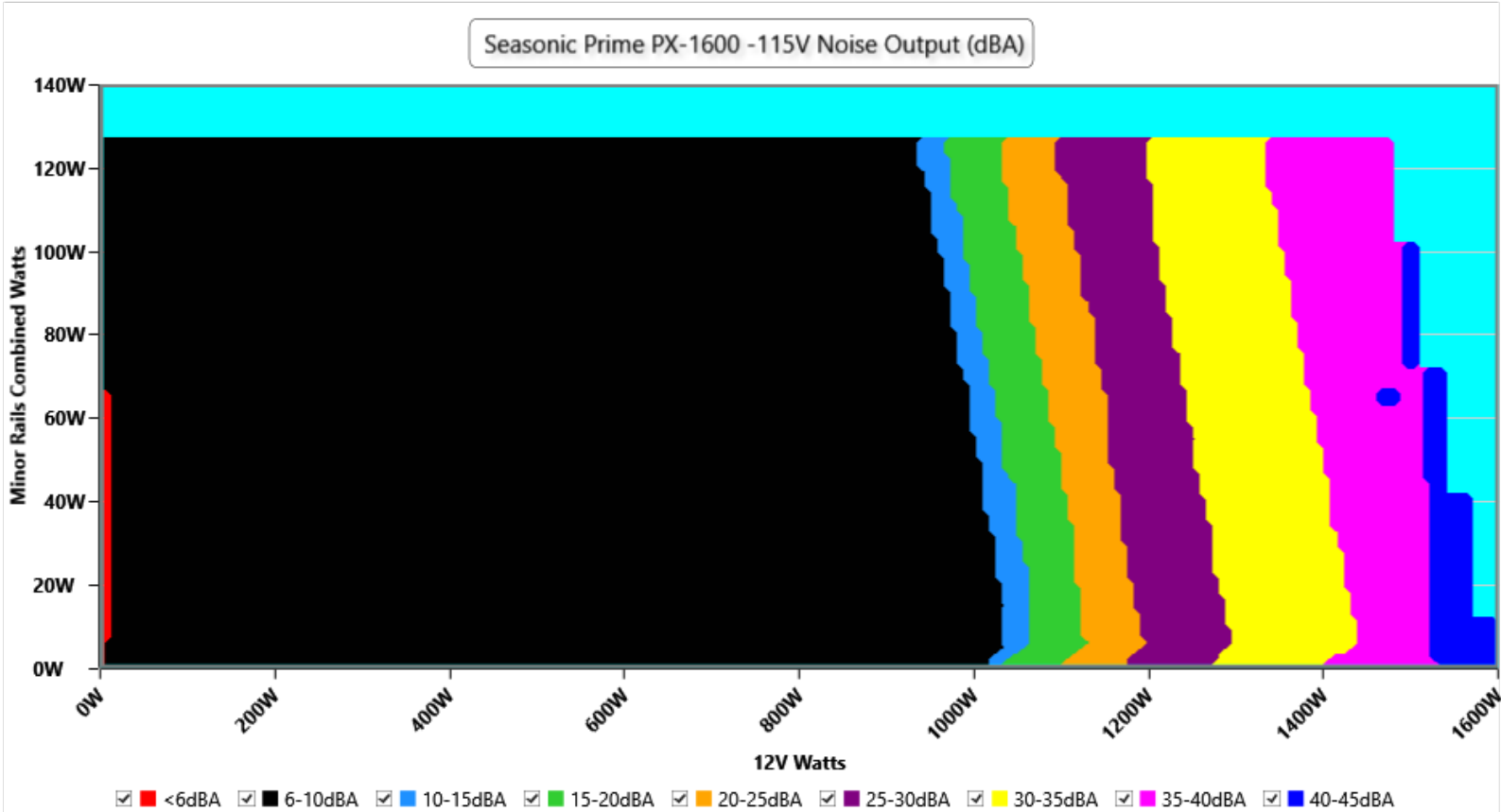


INFO

This graph depicts the PSU's efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

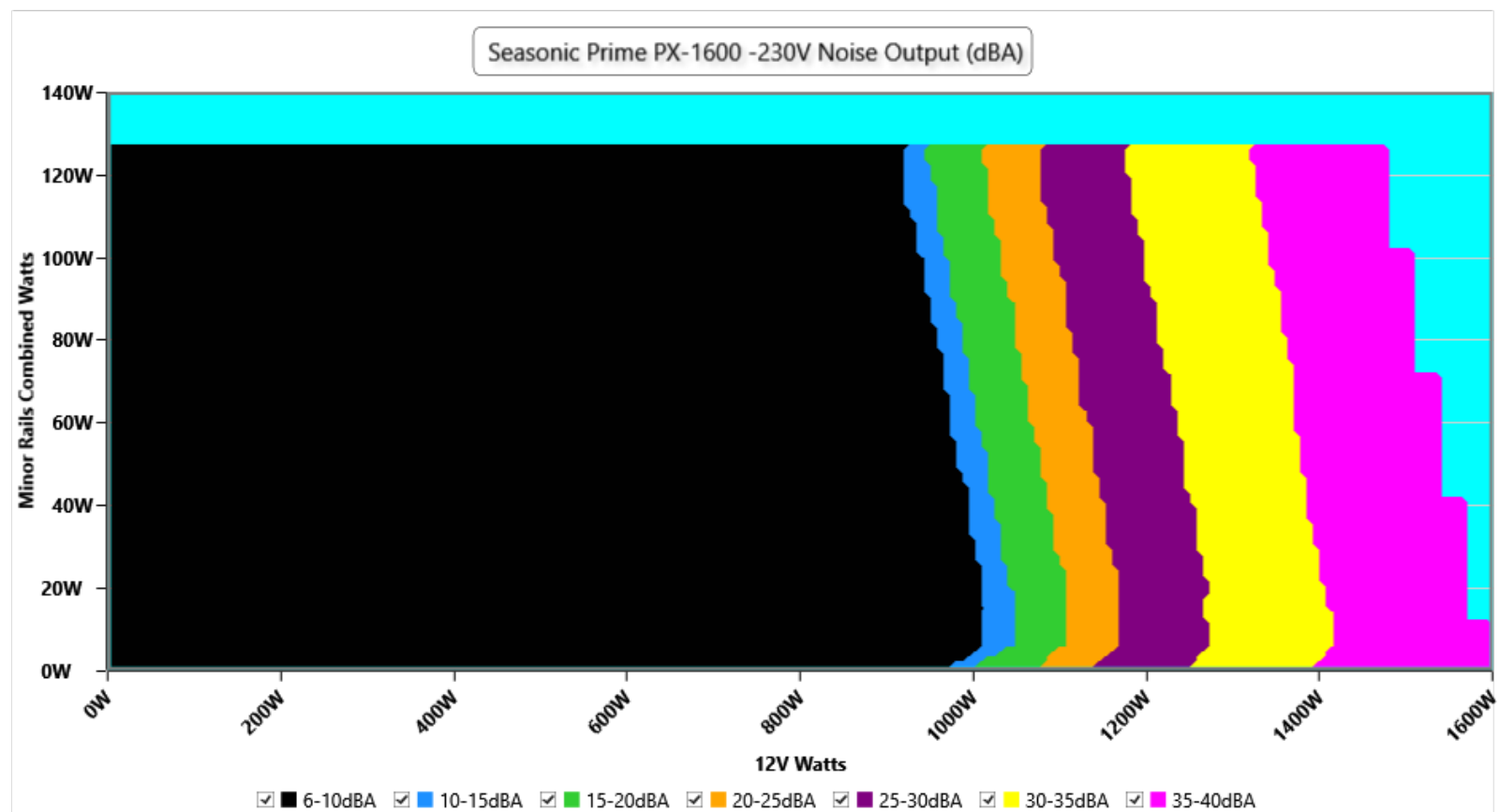
Noise Graph

115V



INFO

The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails



INFO

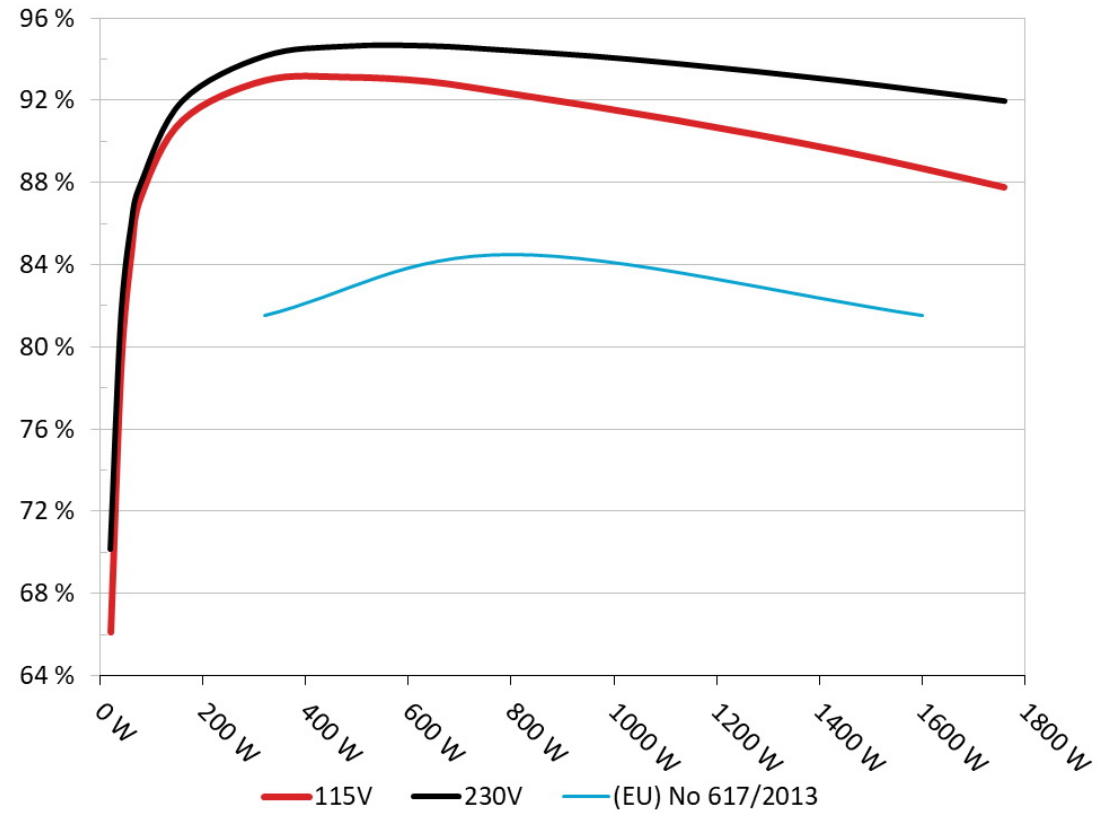
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Seasonic Prime PX-1600

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



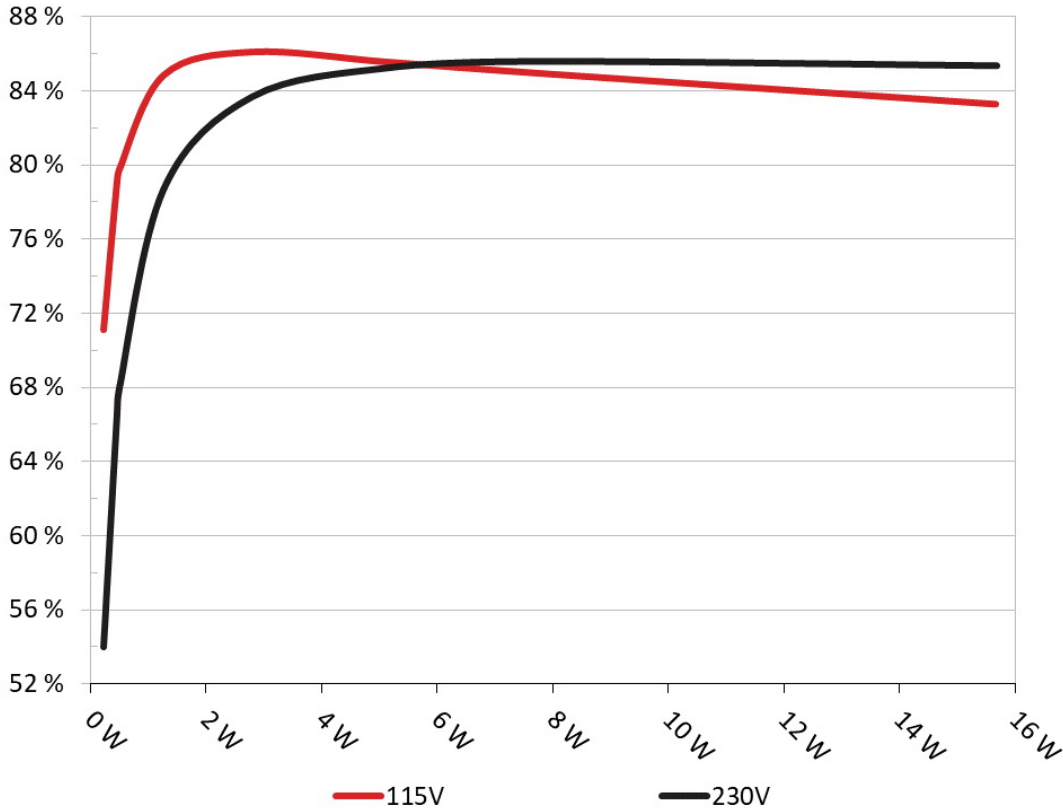
INFO

The PSU's efficiency under high ambient temperatures with 115V and 230V input. For this graph the results of the 10-110% load regulation table are used

5VSB Efficiency

5VSB Efficiency: Seasonic Prime PX-1600

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



INFO

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

5VSB Efficiency (ERP LOT 3/6 & CEC)

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.228W	70.597%	0.031
	5.074V	0.323W		114.87V
2	0.09A	0.457W	78.473%	0.055
	5.074V	0.582W		114.88V
3	0.55A	2.801W	85.585%	0.258
	5.094V	3.273W		114.87V
4	1A	5.123W	85.044%	0.375
	5.123V	6.024W		114.87V
5	1.5A	7.74W	84.438%	0.448
	5.159V	9.166W		114.87V
6	3A	15.663W	82.768%	0.532
	5.221V	18.924W		114.87V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229W	53.487%	0.012
	5.078V	0.429W		229.78V
2	0.09A	0.457W	65.79%	0.02
	5.077V	0.695W		229.78V
3	0.55A	2.802W	83.205%	0.092
	5.095V	3.368W		229.78V
4	1A	5.125W	84.753%	0.158
	5.124V	6.047W		229.78V
5	1.5A	7.737W	85.112%	0.22
	5.157V	9.089W		229.78V
6	3A	15.681W	84.876%	0.328
	5.228V	18.475W		229.77V

Supplementary Tests (For Reference)

Typical Load Tests

115V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
10%	11.460A	1.982A	1.989A	0.975A	159.982	91.544%	0	<6.0	44.54°C	0.975
	12.076V	5.044V	3.317V	5.125V	174.766				40.29°C	114.82V
20%	23.943A	2.975A	2.987A	1.169A	319.941	93.477%	0	<6.0	45.29°C	0.983
	12.072V	5.041V	3.315V	5.133V	342.263				40.75°C	114.77V
30%	36.720A	3.473A	3.486A	1.362A	479.147	93.639%	0	<6.0	46.43°C	0.983
	12.067V	5.039V	3.313V	5.138V	511.696				41.49°C	114.71V
40%	49.607A	3.971A	3.986A	1.556A	639.567	93.421%	0	<6.0	47.39°C	0.987
	12.062V	5.037V	3.311V	5.141V	684.616				41.78°C	114.66V
50%	62.108A	4.965A	4.987A	1.751A	799.314	92.834%	472	9.0	42.32°C	0.992
	12.056V	5.035V	3.309V	5.14V	861.012				48.33°C	114.59V
60%	74.686A	5.962A	5.988A	1.946A	959.821	92.215%	474	9.1	42.94°C	0.994
	12.051V	5.032V	3.307V	5.139V	1040.861				49.51°C	114.54V
70%	87.208A	6.96A	6.992A	2.14A	1119.545	91.548%	607	16.1	43.36°C	0.994
	12.045V	5.03V	3.304V	5.139V	1222.904				50.41°C	114.47V
80%	99.813A	7.958A	7.995A	2.239A	1279.59	90.829%	858	27.5	43.63°C	0.995
	12.039V	5.027V	3.302V	5.135V	1408.78				51.66°C	114.4V
90%	112.760A	8.456A	8.484A	2.339A	1439.404	90.062%	1093	34.7	44.99°C	0.995
	12.033V	5.025V	3.3V	5.131V	1598.242				54.01°C	114.33V
100%	125.524A	8.957A	9.005A	2.916A	1599.427	89.202%	1385	41.5	45.53°C	0.996
	12.027V	5.023V	3.299V	5.143V	1793.038				55.61°C	114.26V
110%	138.235A	9.958A	10.103A	2.922A	1760.043	88.283%	1894	50.1	46.55°C	0.996
	12.021V	5.021V	3.296V	5.134V	1993.628				57.45°C	114.18V
CL1	0.117A	14.993A	15.043A	0A	126.316	86.836%	476	9.1	41.72°C	0.968
	12.064V	5.022V	3.298V	5.093V	145.459				47.25°C	114.81V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL2	0.116A	24.862A	0A	0A	126.249	85.363%	474	9.1	40.34°C	0.969
	12.065V	5.022V	3.309V	5.094V	147.895				47.35°C	114.82V
CL3	0.115A	0A	25.035A	0A	83.904	80.078%	473	9.0	41.33°C	0.961
	12.067V	5.029V	3.296V	5.093V	104.776				50.35°C	114.83V
CL4	133.031A	0A	0A	0A	1599.979	89.613%	1290	40.0	45.97°C	0.996
	12.027V	5.04V	3.315V	5.023V	1785.434				56.92°C	114.28V

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
10%	11.460A	1.983A	1.989A	0.976A	159.982	92.449%	0	<6.0	44.65°C	0.856
	12.075V	5.043V	3.317V	5.123V	173.057				40.41°C	229.75V
20%	23.945A	2.976A	2.987A	1.169A	319.94	94.634%	0	<6.0	45.59°C	0.914
	12.071V	5.04V	3.315V	5.131V	338.084				40.8°C	229.72V
30%	36.721A	3.473A	3.486A	1.363A	479.139	95.117%	0	<6.0	46.62°C	0.934
	12.066V	5.038V	3.313V	5.137V	503.733				41.35°C	229.7V
40%	49.610A	3.971A	3.986A	1.557A	639.563	95.134%	0	<6.0	47.42°C	0.944
	12.061V	5.036V	3.311V	5.14V	672.279				41.82°C	229.67V
50%	62.114A	4.966A	4.986A	1.751A	799.31	94.906%	473	9.0	42.24°C	0.951
	12.055V	5.034V	3.309V	5.14V	842.216				48.26°C	229.64V
60%	74.695A	5.962A	5.988A	1.946A	959.813	94.633%	474	9.1	42.46°C	0.957
	12.050V	5.032V	3.307V	5.139V	1014.251				49.15°C	229.61V
70%	87.213A	6.959A	6.991A	2.14A	1119.523	94.28%	642	18.0	43.4°C	0.963
	12.044V	5.03V	3.305V	5.14V	1187.443				50.46°C	229.58V
80%	99.815A	7.957A	7.994A	2.239A	1279.559	93.88%	580	14.5	43.84°C	0.968
	12.039V	5.027V	3.302V	5.136V	1362.976				52.01°C	229.55V
90%	112.748A	8.453A	8.481A	2.338A	1439.358	93.446%	1110	35.2	44.68°C	0.972
	12.034V	5.027V	3.301V	5.132V	1540.322				54.01°C	229.52V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
100%	125.516A	8.957A	9.003A	2.916A	1599.409	92.959%	1373	41.3	45.21°C	0.976
	12.028V	5.024V	3.299V	5.145V	1720.545				55.29°C	229.49V
110%	138.222A	9.957A	10.101A	2.921A	1760.02	92.454%	1776	48.2	46.52°C	0.979
	12.022V	5.021V	3.297V	5.136V	1903.658				57.45°C	229.46V
CL1	0.116A	14.993A	15.04A	0A	126.309	87.453%	476	9.1	40.74°C	0.833
	12.065V	5.022V	3.298V	5.091V	144.442				46.25°C	229.74V
CL2	0.115A	24.862A	0A	0A	126.243	85.957%	476	9.1	41.25°C	0.835
	12.066V	5.022V	3.309V	5.092V	146.878				48.28°C	229.75V
CL3	0.114A	0A	25.034A	0A	83.9	80.781%	475	9.1	40°C	0.784
	12.067V	5.029V	3.296V	5.091V	103.867				49.01°C	229.75V
CL4	133.030A	0A	0A	0A	1599.961	93.211%	1296	40.2	45.17°C	0.976
	12.027V	5.04V	3.315V	5.02V	1716.48				56.11°C	229.5V

The results above are not used in the certification process

Light Load Tests

115V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
20W	1.230A	0.494A	0.496A	0.197A	19.989	66.631%	0	<6.0	39.61°C	0.855
	12.072V	5.055V	3.325V	5.089V	30.003				36.53°C	114.86V
40W	2.706A	0.693A	0.695A	0.294A	39.989	79.477%	0	<6.0	41.24°C	0.923
	12.081V	5.052V	3.323V	5.097V	50.315				37.98°C	114.86V
60W	4.182A	0.891A	0.894A	0.392A	59.989	85.098%	0	<6.0	41.81°C	0.94
	12.079V	5.048V	3.32V	5.099V	70.49				38.01°C	114.86V
80W	5.655A	1.09A	1.094A	0.489A	79.931	87.909%	0	<6.0	43.69°C	0.954
	12.078V	5.046V	3.319V	5.106V	90.915				39.72°C	114.84V

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
20W	1.230A	0.495A	0.496A	0.197A	19.989	70.656%	0	<6.0	39.61°C	0.5
	12.073V	5.054V	3.325V	5.088V	28.295				36.55°C	229.78V
40W	2.706A	0.693A	0.695A	0.294A	39.989	81.73%	0	<6.0	40.38°C	0.627
	12.080V	5.052V	3.323V	5.094V	48.93				37.09°C	229.77V
60W	4.182A	0.891A	0.894A	0.392A	59.989	86.358%	0	<6.0	42.25°C	0.701
	12.079V	5.048V	3.32V	5.096V	69.447				38.73°C	229.77V
80W	5.654A	1.09A	1.094A	0.49A	79.928	88.491%	0	<6.0	43.29°C	0.76
	12.079V	5.046V	3.319V	5.105V	90.316				39.44°C	229.76V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	10.64mV	13.64mV	10.59mV	13.45mV	Pass
20% Load	11.46mV	12.77mV	10.84mV	29.67mV	Pass
30% Load	10.85mV	13.33mV	11.00mV	22.35mV	Pass
40% Load	11.20mV	13.64mV	10.54mV	21.07mV	Pass
50% Load	11.46mV	13.23mV	10.95mV	16.93mV	Pass
60% Load	11.97mV	13.90mV	11.97mV	22.66mV	Pass
70% Load	12.84mV	14.51mV	11.76mV	25.27mV	Pass
80% Load	12.79mV	14.36mV	13.14mV	25.63mV	Pass
90% Load	12.48mV	15.58mV	13.04mV	26.04mV	Pass
100% Load	19.49mV	15.81mV	13.39mV	27.30mV	Pass
110% Load	21.03mV	16.77mV	13.90mV	28.48mV	Pass
Crossload1	14.93mV	15.20mV	14.58mV	10.81mV	Pass
Crossload2	11.56mV	23.04mV	12.89mV	10.54mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	9.92mV	13.69mV	21.28mV	10.59mV	Pass
Crossload4	19.67mV	14.93mV	10.69mV	13.56mV	Pass

The results above are not used in the certification process

230V

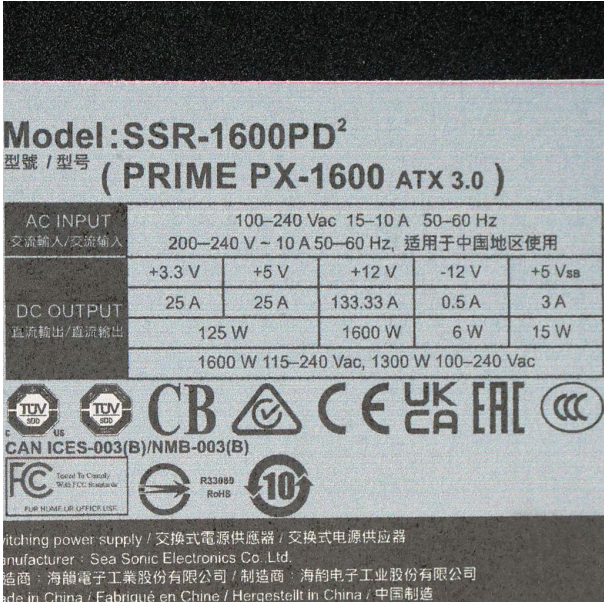
Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	10.75mV	13.28mV	10.69mV	14.37mV	Pass
20% Load	10.59mV	13.23mV	10.59mV	30.59mV	Pass
30% Load	10.95mV	12.98mV	10.90mV	21.69mV	Pass
40% Load	11.56mV	13.54mV	11.61mV	21.84mV	Pass
50% Load	11.61mV	13.43mV	10.90mV	16.83mV	Pass
60% Load	12.79mV	14.36mV	11.51mV	21.49mV	Pass
70% Load	12.43mV	14.20mV	11.56mV	25.47mV	Pass
80% Load	12.74mV	14.10mV	12.69mV	25.98mV	Pass
90% Load	12.69mV	15.94mV	13.35mV	25.47mV	Pass
100% Load	21.45mV	15.83mV	13.66mV	24.75mV	Pass
110% Load	22.79mV	15.65mV	14.03mV	27.96mV	Pass
Crossload1	15.70mV	15.36mV	14.20mV	10.37mV	Pass
Crossload2	11.82mV	22.89mV	13.91mV	9.97mV	Pass
Crossload3	10.44mV	14.20mV	21.99mV	10.59mV	Pass
Crossload4	20.04mV	14.96mV	11.29mV	13.24mV	Pass

The results above are not used in the certification process

Seasonic Prime PX-1600 (ATX v3.0)



Top side



Power specifications label

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